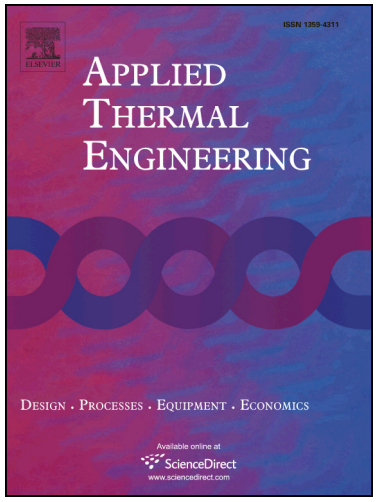

Research Paper

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PII: S1359-4311(17)30879-7
DOI: http://dx.doi.org/10.1016/j.applthermaleng.2017.02.039
Reference: ATE 9920

To appear in: *Applied Thermal Engineering*

Received Date: 17 June 2016
Revised Date: 31 January 2017
Accepted Date: 9 February 2017

Please cite this article as: G. Gonca, B. Sahin, Effect of Turbo Charging and Steam Injection Methods on the Performance of a Miller Cycle Diesel Engine (MCDE), *Applied Thermal Engineering* (2017), doi: http://dx.doi.org/10.1016/j.applthermaleng.2017.02.039

Effect of Turbo Charging and Steam Injection Methods on the Performance of a Miller Cycle Diesel Engine (MCDE)

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Abstract

In this study, application of the steam injection method (SIM), Miller cycle (MC) and turbo charging (TC) techniques into a four stroke, direct-injection diesel engine has been numerically and empirically conducted. NOx emissions have detrimental influences on the environment and living beings. They are formed at the high temperatures, thus the Diesel engines are serious NOx generation sources since they have higher compression ratios and higher combustion temperatures. The international regulations have decreased the emission limits due to environmental reasons. The Miller cycle (MC) application and steam injection method (SIM) have been popular to abate NOx produced from the internal combustion engines (ICEs), in the recent years. However, the MC application can cause a reduction in power output. The most known technique which maximizes the engine power and abates exhaust emissions is TC. Therefore, if these three techniques are combined, the power loss can be tolerated and pollutant emissions can be minimized. While the application of the MC and SIM causes to diminish in the brake power and brake thermal efficiency of the engine up to 6.5% and 10%, the TC increases the brake power and brake thermal efficiency of the engine up to 18% and 12%. The experimental and theoretical results have been compared in terms of the torque, the specific fuel consumption (SFC), the brake power and the brake thermal efficiency. The results acquired from theoretical modeling have been validated with empirical data with less than 7% maximum error. The results showed that developed

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